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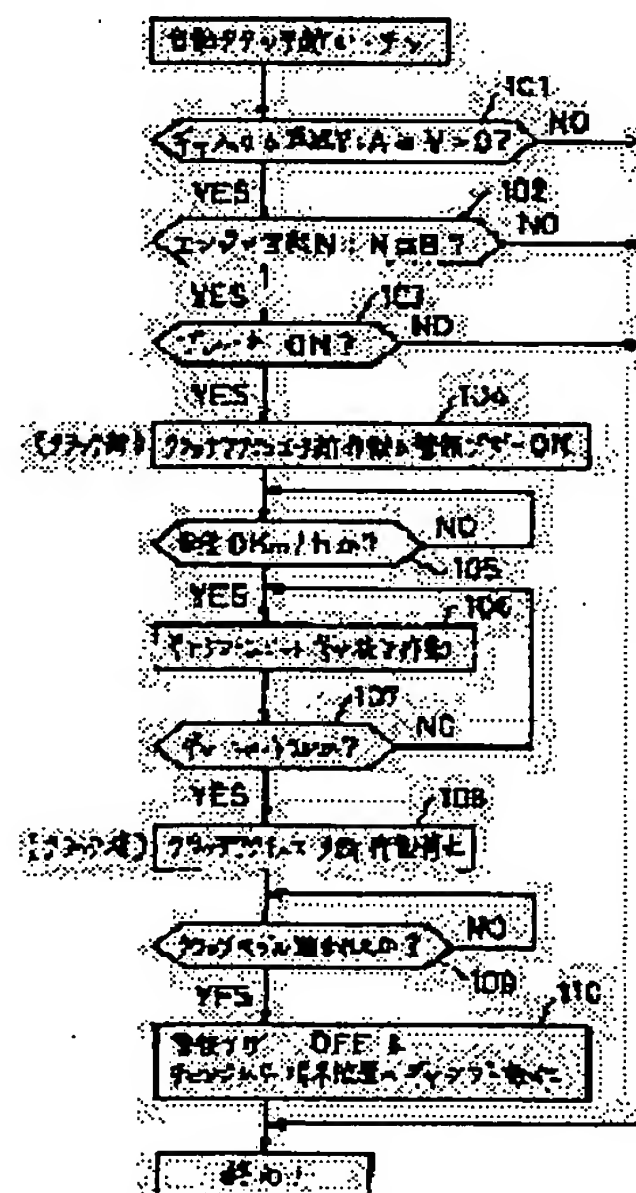
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## (54) CLUTCH CONTROL DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To avoid popping out of a vehicle at the time of key switch off in a semi-automatic transmission system.

SOLUTION: In the case when a brake is put on (step 103) when car velocity is  $A \geq V > 0$  and engine speed  $N$  is  $N \leq B$  while a vehicle travels with a gear input, a clutch is disengaged by actuating a clutch actuator to disengage (step 104). When the vehicle stops (step 105), a gear is returned to neutral (step 107) by actuating a gear shift unit to jump out (step 106), disengagement actuation of the clutch actuator is stopped (step 108), and the clutch is engaged.



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**CLAIMS**

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[Claim(s)]

[Claim 1] The clutch control unit which makes a clutch \*\* automatically following the brakes operation under vehicles run which supplies a gear, and under predetermined conditions characterized by providing the following A halt detection means to detect a halt of the vehicles in the state where the aforementioned clutch is automatically made into \*\* Control means which make the aforementioned clutch \*\* while returning the aforementioned gear neutrally, when a halt of vehicles is detected by this halt detection means

[Claim 2] The clutch control unit which makes a clutch \*\* automatically following the brakes operation under vehicles run which supplies a gear, and under predetermined conditions characterized by providing the following A halt detection means to detect a halt of the vehicles in the state where the aforementioned clutch is automatically made into \*\* Control means which make the aforementioned clutch \*\* while returning the aforementioned gear neutrally, when a halt of vehicles is detected by this halt detection means A gearshift means to shift the aforementioned gear to the directions position of the change lever at that time according to the bottom of \*\* of the clutch pedal in the state where the aforementioned gear is neutrally returned by these control means, and the aforementioned clutch is made \*\*

[Claim 3] The clutch control unit characterized by emitting an alarm in a claim 2 after a clutch is automatically made into \*\* until clutch pedal is carried out under \*\*.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention is used for a semi-automatic transmission system, and relates to a suitable clutch control unit.

[0002]

[Description of the Prior Art] In an automobile, especially a large-sized shuttle bus, start and a halt are performed frequently and gear change operation is repeated by the remarkable number of times on stream. This gear change operation was performed by the change lever of a driver's seat, about 10m to the transmission of this change lever empty-vehicle object posterior part, a certain interval was connected with the long rod, and the gear ratio of transmission is changed through this rod. For this reason, both the operating physical force of a change lever and a stroke are large, and have become the cause which causes defatigation of an operator.

[0003] Then, instead of connecting a change lever and transmission with a rod in recent years A change lever unit and a control unit are connected by electric wiring. So that a change lever position signal may be sent to a control unit according to operation of the change lever in a change lever unit Nothing, Generate a shift control signal (gear change control signal) in a control unit, and this generated shift control signal is sent to a gearshift unit. The finger-control transmission system (hereafter referred to as FCT) which changed the gear ratio of transmission is adopted.

[0004] In this FCT, a shift control signal is generated based on the change lever position signal from a change lever unit, and this generated shift control signal is sent to a gearshift unit from a control unit. And by this shift control signal, the solenoid valve attached to the selection cylinder and shift cylinder in a gearshift unit drives alternatively, the supply state of the compressed air from an air tank is changed, the piston position within the above-mentioned cylinder is changed, the shift fork of the selection operation section moves and the gear ratio of transmission is changed. If this FCT is used, gear change operation can be transposed to an electric pneumatic-control mechanism from a mechanical remote-operation mechanism, can reduce an operating physical force and a shift stroke sharply, and can mitigate operation defatigation.

[0005] In this FCT, the change of the gear ratio of transmission is performed by carrying out clutch pedal under \*\* like the usual manual gear change system. Namely, on the occasion of the change of the gear ratio of transmission, clutch pedal is carried out under \*\* and a change lever is operated by making a clutch into \*\*. On the other hand, it is made to lose the clutch pedal at the time of a high-speed stage run, and operation of a change lever by using FCT as a semi-automatic transmission system to JP,6-241314,A with an indication, now the "semi-automatic formula change gear equipment" which is.

[0006] That is, at the time of the low-speed stage run as which delicate control is required of a clutch meat, it is made to change a gear ratio by manual operation, and is made to change a gear ratio at the time of the high-speed stage run as which delicate control is not required so much of a clutch meat automatically at it. In this case, the change of the automatic gear ratio at the time of a high-speed stage run determines the run stage according to operational status, gives it to the clutch actuator and gearshift unit which attached the control command to this determined

run stage to the clutch, and is performed by controlling \*\*\*\* operation of a clutch, and gearshift operation of a gearshift unit.

[0007] In this semi-automatic transmission system, since the clutch actuator is used, when brakes are applied in a low-speed region, it does not call at the bottom of \*\* of clutch pedal, but \*\* can also avoid an engine failure by making a clutch into \*\* automatically during the vehicles run which supplies a gear.

[0008]

[Problem(s) to be Solved by the Invention] However, in this semi-automatic transmission system, when a clutch was automatically made into \*\* during the vehicles run which supplies a gear following brakes operation and the key switch was made off in the state where clutch pedal is not stepped on (without it returns a gear neutrally) without returning a change lever neutrally after a vehicles halt or, vehicles might jump out. That is, if a key switch is made off, since the power supply to a clutch actuator is severed, a clutch will be made into \*\*. If it is that a change lever is returned neutrally and there is nothing at this time (the gear is not returned neutrally), or when clutch pedal shall be stepped on, since an engine does not immediately stop after key-switch-off for inertia (it rotates for 1 - 2 seconds), it has a possibility that vehicles may jump out.

[0009] The place which it was made in order that this invention might solve such a technical problem, and is made into the purpose is in a semi-automatic transmission system to offer the possible clutch control unit of avoiding the elutriation of the vehicles at the time of key-switch-off.

[0010]

[Means for Solving the Problem] In order to attain such a purpose, it is made to make a clutch \*\* while the 1st invention (invention concerning a claim 1) makes a clutch \*\* automatically following the brakes operation under vehicles run which supplies a gear, and under predetermined conditions, detects a halt of the vehicles in the state where the clutch is automatically made into \*\* and returns a gear neutrally. A clutch is made into \*\* while according to this invention a gear will be neutrally returned when vehicles stop, if a clutch is automatically made into \*\* following brakes operation.

[0011] Under the vehicles run whose 2nd invention (invention concerning a claim 2) supplies a gear, While making a clutch into \*\* automatically following the brakes operation under predetermined conditions While detecting a halt of the vehicles in the state where the clutch is automatically made into \*\* and returning a gear neutrally, it is made to make a clutch into \*\*. Furthermore, it is made to shift a gear to the directions position of the change lever at that time according to the bottom of \*\* of the clutch pedal in the state where a gear is returned neutrally and the clutch is made into \*\*. A clutch is made into \*\* while according to this invention a gear will be neutrally returned when vehicles stop, if a clutch is automatically made into \*\* following brakes operation. A gear will be shifted to the directions position of the change lever at that time if clutch pedal is carried out under \*\* in this state.

[0012] In the 2nd invention, the 3rd invention (invention concerning a claim 3) emits an alarm after a clutch is automatically made into \*\* until clutch pedal is carried out under \*\*. according to this invention — \*\*\*\*\*—> — an alarm buzzer carries out singing to the bottom of vehicles halt -> gear omission (neutral \*\*) -> clutch \*\* -> clutch pedal \*\*, for example

[0013]

[Embodiments of the Invention] Hereafter, this invention is explained in detail based on an operation gestalt. Drawing 2 is the system configuration view showing 1 operation gestalt of the semi-automatic transmission system which comes to apply this invention. The clutch actuator with which an engine and 1A were attached for a clutch and 2A to the electronic centrifugal spark advancer, and 2 was attached for 1 to the clutch 2 in this drawing (CLAC), 2B 3 way bulb and 2D for a clutch stroke sensor and 2C A double check valve, Two E1 and two E2 A control valve and 3 Transmission, A gearshift unit (GSU) and 5 4 A change lever unit (CLU), 6 A semi-automatic transmission control unit (semi automatic T/M ECU), For a brake pedal and 10, as for an alarm buzzer and 12, an accelerator pedal and 11 are [ the master cylinder by which 7 was attached for clutch pedal and 8A to the electronic centrifugal-spark-advancer control unit



(electronic centrifugal spark advancer ECU), and 8 was attached to clutch pedal 8, and 9 / a gear position indicator and 13 ] air tanks.

[0014] The change lever unit 5 is equipped with five positions of N (neutral), R (reverse), S (run) and UP (shift up), and DOWN (down shift) for the shift pattern of the change lever 5A, as shown in drawing 3. Among these, if a hand is lifted from change lever 5A after operation when it puts into each position of N position, R position, and S position, change lever 5A will stop in this position. On the other hand, by UP position and the DOWN position, if a hand is lifted from change lever 5A, it will return to S position automatically.

[0015] The electronic centrifugal spark advancer ECU 7 considers as an input the amount signal of accelerator treading in, engine speed signal, and vehicle speed signal which answer the amount of treading in of an accelerator pedal 10, and is semi automatic T/M. Electronic centrifugal-spark-advancer 1A is controlled performing serial communication between ECUs6.

[0016] Semi automatic T/M At the time of a low-speed stage run, the gear ratio by manual operation is changed for the automatic change of a gear ratio at the time of a high-speed stage run, ECU6 considering the change lever position signal from the change lever unit 5, the brake-on signal which answers the bottom of \*\* of a brake pedal 9, the gear position signal from the gearshift unit 4, and the clutch stroke signal from clutch stroke sensor 2B as an input, and performing serial communication between the electronic centrifugal spark advancers ECU 7 (manual change).

[0017] Namely, semi automatic T/M At the time of a low-speed stage run, based on the change lever position signal from the change lever unit 5, ECU6 takes an engine speed and the vehicle speed into consideration, generates an T/M gear control signal (shift control signal), and sends this generated T/M gear control signal to the gearshift unit 4. The gearshift unit 4 is semi automatic T/M. In response to the T/M gear control signal from ECU6, the supply situation of the compressed air from an air tank 13 is changed, and the gear ratio of transmission 3 is changed. In addition, on the occasion of the manual change of a gear ratio, like the usual manual gear change system, clutch pedal 8 is carried out under \*\*, and change lever 5A is operated by making a clutch 2 into \*\*.

[0018] That is, if clutch pedal 8 is carried out under \*\*, it will let a hydraulic line L pass through master cylinder 8A, and oil pressure will be given to relay-valve 2E. In response to this oil pressure, relay-valve 2E supplies the compressed air from an air tank 13 to actuator 2A via double-check-valve 2D, and clutch actuator 2A makes a clutch 2 \*\*. \*\*\*\*\* of this clutch 2 is based on a clutch stroke signal from clutch stroke sensor 2B, and is semi automatic T/M. It is recognized in ECU6. Semi automatic T/M ECU6 generates the T/M gear control signal to the gearshift unit 4 after a check of \*\*\*\*\* of a clutch 2 based on the change lever position signal from the change lever unit 5.

[0019] Moreover, semi automatic T/M At the time of a high-speed stage run, ECU6 determines the run stage according to operational status, gives the control command to this determined run stage to clutch actuator 2A and the gearshift unit 4, and controls \*\*\*\* operation of a clutch 2, and gearshift operation of the gearshift unit 4. Namely, semi automatic T/M At the time of a high-speed stage run, ECU6 grasps operational status from the vehicle speed, the amount of accelerator treading in, etc., and determines the run stage according to this grasped operational status. And giving the control command (a clutch \*\*\*\* control signal and T/M gear control signal) to this determined run stage to 3 way bulb 2C and the gearshift unit 4, and supervising a clutch rotational frequency and an engine speed, \*\*\*\* operation of a clutch 2 and gearshift operation of the gearshift unit 4 are controlled, and an automatic change in the necessary run stage is performed.

[0020] In addition, in this semi-automatic transmission system, during a run, change lever 5A is in S position, and cannot recognize the present gear ratio from the position of change lever 5A. Then, it is made to express the present gear ratio as this operation form using the gear position indicator 12. Namely, semi automatic T/M ECU6 always recognizes the present gear ratio based on the gear position signal from the gearshift unit 4. This semi automatic T/M The present gear ratio which ECU6 recognizes is displayed by the gear position indicator 12.

[0021] Next, semi automatic T/M It explains referring to the flow chart shown in drawing 1 about

processing operation peculiar to this operation form which ECU6 performs. Semi automatic T/M ECU6 confirms whether to be "the vehicle speed V of present that the gear is supplied [ and ] is  $A \geq V > 0$ " in Step 101. With this operation form, it is considering as  $A=30$  km/h. In Step 101, "gear is supplied, and if the present vehicle speed V is 30 or less km/h", it will progress to Step 102.

[0022] The present engine-speed N is checked at Step 102. With [ the present engine-speed N ] B [ below ], i.e.,  $N \leq B$ , it progresses to Step 103 in Step 102. It is referred to as  $B=400$  rpm with this operation form. Incidentally an idling is about 500 rpm.

[0023] At Step 103, it is confirmed whether whether the brake's having been turned on and or not the brake pedal 9 were stepped on. If ON of a brake is checked in Step 103, it will be semi automatic T/M. ECU6 carries out singing of the alarm buzzer 11 while sending clutch \*\*\*\*\* to 3 way bulb 2C (Step 104). 3 way bulb 2C is semi automatic T/M. The supply situation of the compressed air from the air tank 13 to clutch actuator 2A is changed, and clutch actuator 2A is made to \*\*\*\*\* via double-check-valve 2D in response to clutch \*\*\*\*\* from ECU6. Thereby, a clutch 2 serves as \*\*.

[0024] That is, with this operation form, during the vehicles run which supplies a gear, the vehicle speed V is 30 or less km/h, and if a brake pedal 9 is stepped on when engine-speed N is 400 or less rpm, while a clutch 2 will be automatically made into \*\*, the alarm buzzer 11 carries out singing. An engine failure is avoided by \*\* of this clutch 2.

[0025] When vehicles stop (Step 105) (i.e., if the vehicle speed V is set to h in km [ 0 / / ]), it is semi automatic T/M. ECU6 sends the T/M gear control signal to a neutral to the gearshift unit 4, and performs gear omission (Step 106). And based on the gear position signal from the gearshift unit 4, it checks that the gear has been returned neutrally (Step 107), and sending out of clutch \*\*\*\*\* to 3 way bulb 2C is interrupted, namely, clutch \*\*\*\*\* is sent, and \*\*\*\*\* of clutch actuator 2A is stopped (Step 108). Thereby, a clutch 2 serves as \*\*.

[0026] Here, the case where a key switch is made off is considered after a vehicles halt. After a vehicles halt, if a key switch is made off, the power supply to clutch actuator 2A will be severed. Moreover, an engine 1 does not immediately stop after key-switch-off for inertia. However, in this case, the clutch 2 is already made into \*\*, and the gear is also returned neutrally. Therefore, vehicles do not jump out of a key switch as OFF in the state where clutch pedal 8 is not stepped on without returning change lever 5A neutrally.

[0027] Moreover, semi automatic T/M ECU6 shifts a gear to the directions position of change lever 5A at that time while interrupting the singing of the alarm buzzer 11, if clutch pedal 8 is stepped on in Step 109 (i.e., if clutch pedal 8 is carried out under \*\* in the state where a gear is returned neutrally and the clutch 2 is made into \*\*). The start responsibility of vehicles does not fall just because it could leave the position of change lever 5A intact, it could depart after the vehicles halt and it once carried out gear omission at Step 106 by this.

[0028] moreover — this operation form — \*\*\*\*\* (Step 104) → — since a buzzer 11 carries out singing and an operator is told about not being usually operational status to the bottom of vehicles halt (Step 105) → gear omission (Step 106,107) → clutch \*\* (Step 108) → clutch pedal \*\* (Step 109,110), it becomes safer

[0029] Moreover, with this operation form, since gear omission was not performed until a halt of vehicles was checked in Step 105 although the clutch 2 was immediately made into \*\* at Step 104 when ON of a brake was checked at Step 103, when it considers as a method which returns a clutch 2 to \*\* to the acceleration demand after brake-on, for example, operation delay does not arise but a feeling of slowness can be lost.

[0030] That is, when ON of a brake was checked at Step 103, \*\* and gear omission of a clutch 2 were performed at Step 104 and it considers as a method which returns a clutch 2 to \*\* to the acceleration demand after brake-on, gearshift operation to a neutral shell change lever directions position is needed, and operation delay arises. On the other hand, with this operation form, since it is made to perform gear omission after checking a halt of vehicles by TEPPU 105, it becomes possible to lose the feeling of slowness of the acceleration demand after brake-on.

[0031]

[Effect of the Invention] Since a clutch will be made into \*\* while a gear is returned neutrally,

when vehicles stop if a clutch is automatically made into \*\* following brakes operation, by the 1st invention, it becomes possible to avoid the elutriation of the vehicles at the time of key-switch-off, so that clearly from having explained above. It becomes possible to become that from which a gear will be shifted to the directions position of the change lever at that time if a clutch is made into \*\* while a gear is returned neutrally, when the clutch was automatically made into \*\* following brakes operation by the 2nd invention and vehicles stopped, and clutch pedal is carried out under \*\* by this state, and to make it not reduce the start responsibility of vehicles in addition to the 1st effect of the invention. the 3rd invention -- the 2nd invention -- setting -- \*\*\*\*\*-> -- under vehicles halt -> gear omission (neutral \*\*) -> clutch \*\* -> clutch pedal \*\*, an alarm buzzer tells an operator about not being usually operational status as a singing \*\*\*\* thing, and it becomes possible to suppose that it is safer, for example

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[Translation done.]